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ENVIRONMENTAL MANAGEMENT

8291/12

Paper 1 Principles of Environmental Management

October/November 2024

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Section A: answer **all** questions.
- Section B: answer **one** question.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.



Section A

Answer **all** questions in this section.

1 (a) Fig. 1.1 shows the mean annual ground level ozone concentration by country.

Key

mean annual ground level ozone concentration / parts per billion

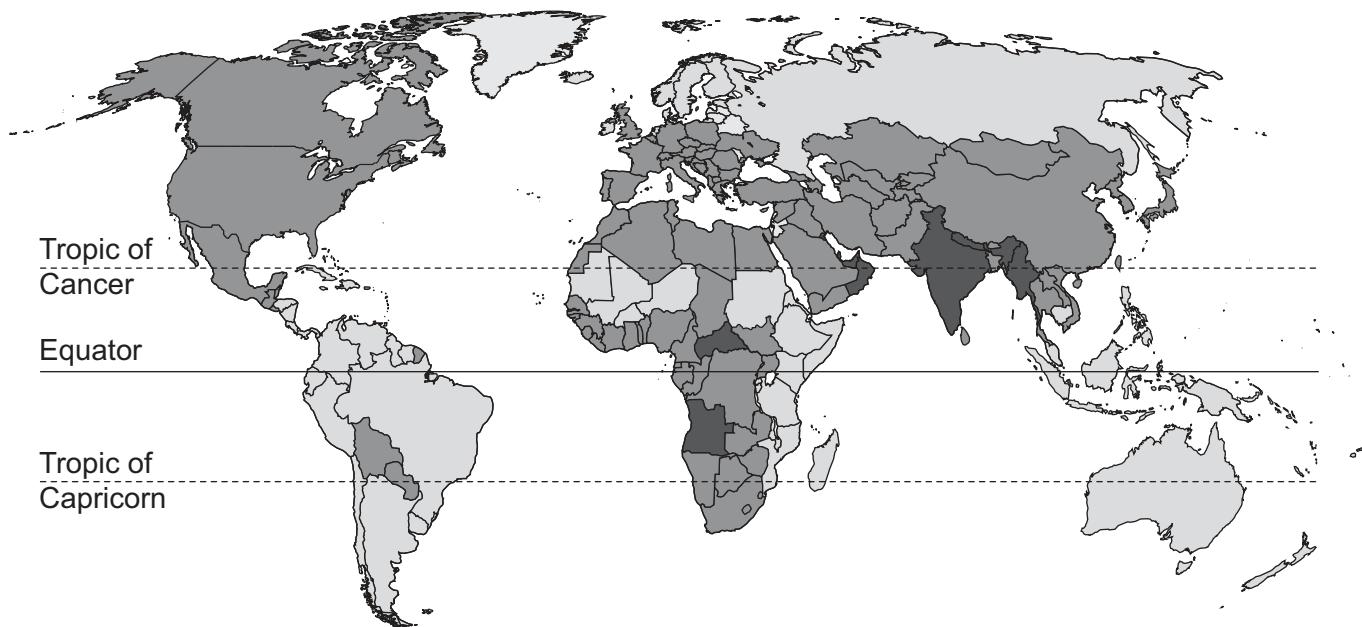
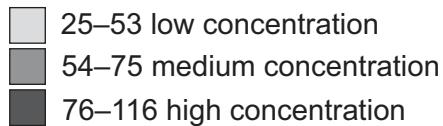


Fig. 1.1

(i) Describe the distribution of mean annual ground level ozone concentration shown in Fig. 1.1.

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[3]





(ii) Ground level ozone is involved in the formation of photochemical smog.

Describe the formation of photochemical smog.

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[3]

(iii) Photochemical smog can impact human health.

State **two** other impacts of photochemical smog.

1

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2

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[2]

(b) Methane is an atmospheric pollutant.

Suggest **three** ways of reducing the concentration of atmospheric methane.

1

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2

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3

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[3]





(c) Fig. 1.2 shows changes in mean global temperature predicted by different computer climate models.

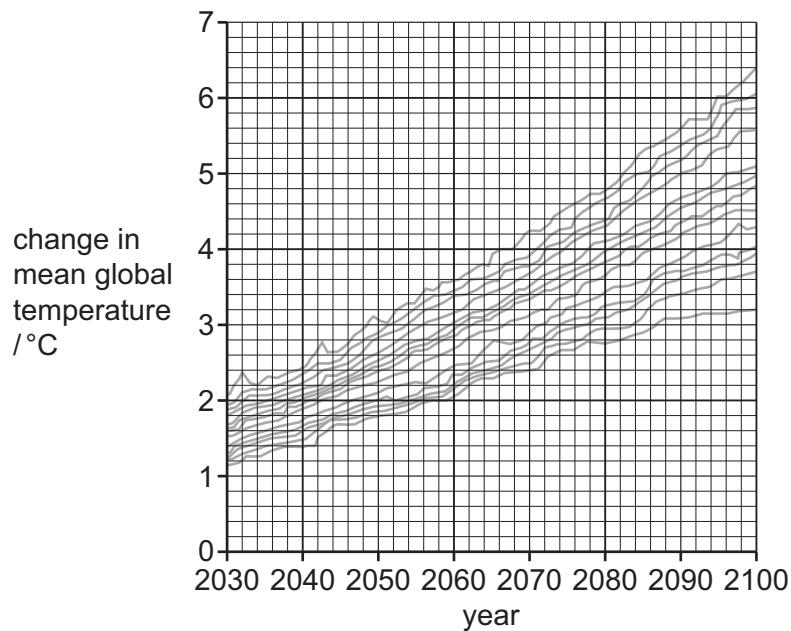


Fig. 1.2

(i) Calculate the range for the change in mean global temperature in 2100 shown by the different climate models in Fig. 1.2.

Give your answer to **one** decimal place.

$$\text{range} = \dots \text{ } ^\circ\text{C} \quad [2]$$

(ii) Computer climate models give different predictions for the change in mean global temperature.

Suggest **three** reasons why it is difficult to predict climate change.

1

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2

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3

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[3]

[Total: 16]



* 0000800000005 *



5

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[Turn over]



2 (a) Fig. 2.1 shows an emerald dragonfly. The wings of the dragonfly have been marked with paint as part of a capture-mark-recapture investigation.



Fig. 2.1

(i) Describe how capture-mark-recapture can be used to estimate the population of dragonflies in a wetland habitat.

[5]





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(ii) Suggest **three** limitations of capture-mark-recapture for estimating the population of dragonflies.

1

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2

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3

.....

[3]

(b) In 2021, the International Union for Conservation of Nature (IUCN) stated that 16% of the 6016 dragonfly species were at risk of extinction.

(i) Calculate the number of dragonfly species that were at risk of extinction.
Give your answer as a whole number.

number of species = [1]

(ii) Suggest **three** factors that put dragonfly species at risk of extinction.

1

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2

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3

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[3]





(c) Fig. 2.2 shows a food web containing dragonflies.

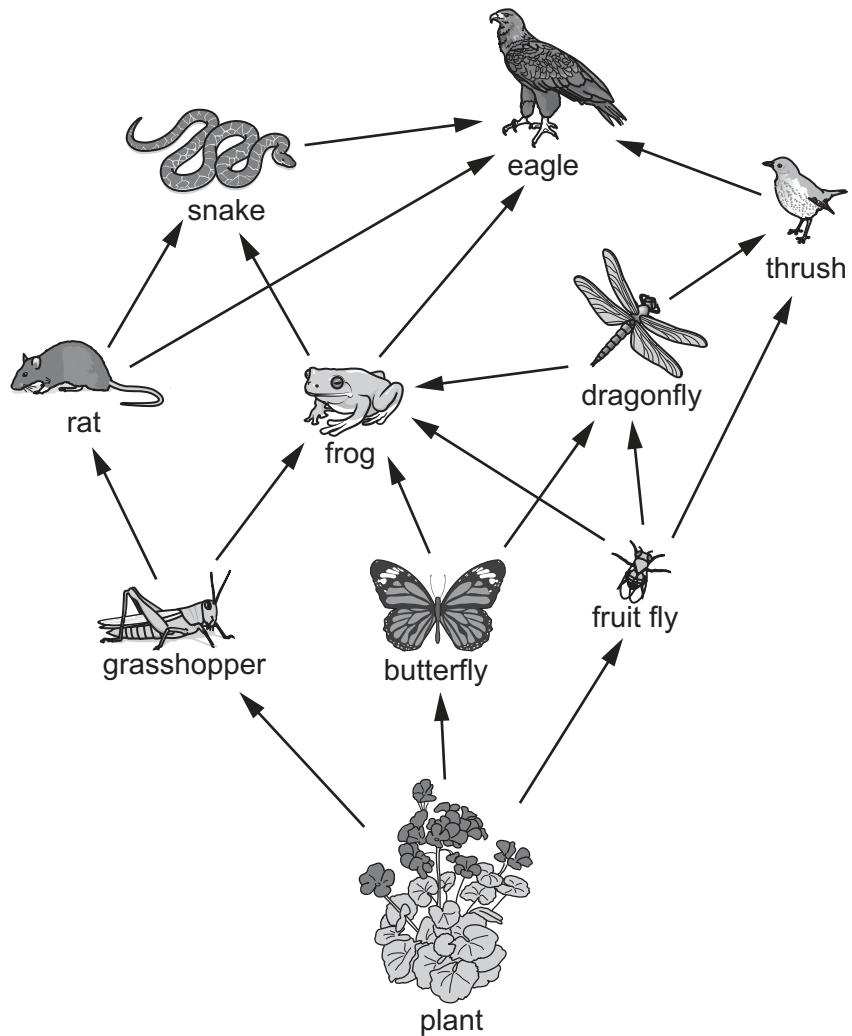


Fig. 2.2

(i) Construct a food chain containing four trophic levels from the food web shown in Fig. 2.2.

..... [2]

(ii) Name an organism in Fig. 2.2 that feeds as both a secondary consumer and a tertiary consumer.

..... [1]



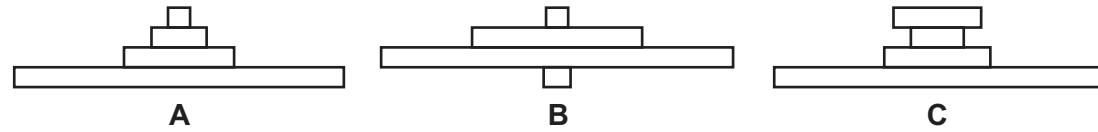


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(iii) Identify the pyramid of energy for the food chain in (i) by drawing a circle around **A**, **B** or **C**.

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Explain your choice.



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explanation
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[3]

[Total: 18]





3 (a) An electrofuel is a fuel produced from water using electricity. Some electrofuels are carbon neutral.

Fig. 3.1 shows the production of an electrofuel.

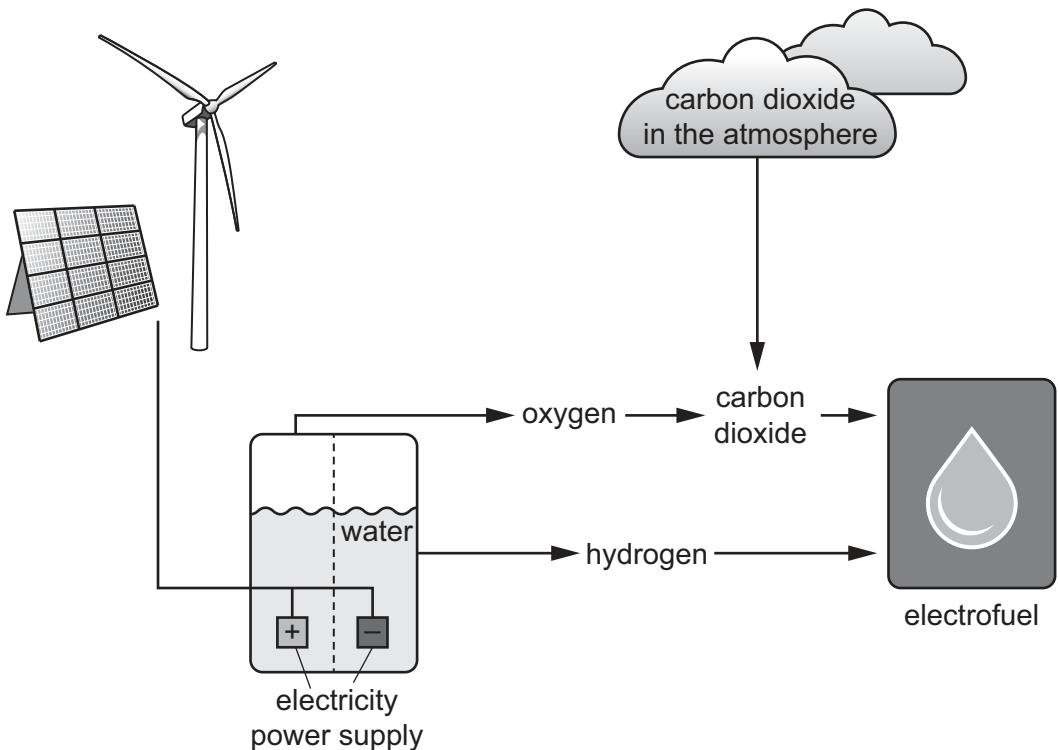


Fig. 3.1

(i) Suggest why the electrofuel shown in Fig. 3.1 is carbon neutral.

.....

 [2]

(ii) A student says that the production of electrofuels will be lower in low-income economies (LICs) compared to high-income economies (HICs).

Suggest reasons why.

.....

 [3]





(b) Developing carbon neutral fuels is one strategy for managing energy security.

(i) Define energy security.

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[3]

(ii) Rationing can also be used to manage energy security.

Evaluate rationing as a strategy for managing energy security.

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[4]

(iii) Describe **two** other strategies for managing energy security.

1
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2
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[2]

[Total: 14]



4 Fig. 4.1 shows the mass of waste by disposal method for the UK between 2005 and 2020.

Key

- recycled and composted
- incinerated
- landfill

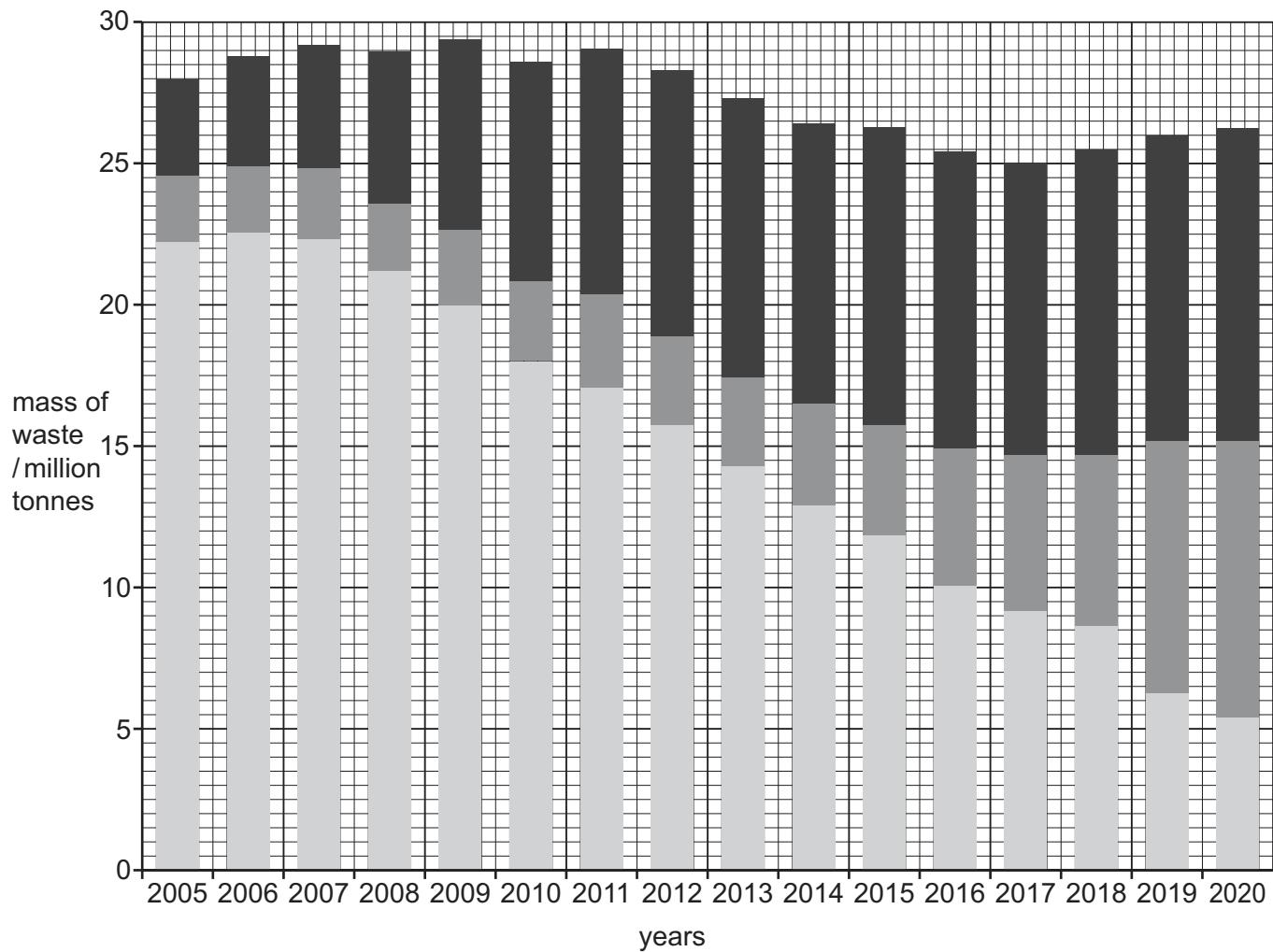


Fig. 4.1

(a) Describe the trends in the mass of waste by disposal method for the UK between 2005 and 2020.

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[3]



(b) Fig. 4.2 shows a waste incinerator.



Fig. 4.2

(i) Suggest **two** benefits of waste incineration.

1

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2

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[2]

(ii) Some plastic waste is unsuitable for disposal by incineration.

Suggest **two** other limitations of waste incineration.

1

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2

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[2]





(iii) State **two** strategies for limiting the impacts of plastic waste disposal.

1

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2

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[2]

(c) Landfill sites have been linked to biomagnification.

Explain the process of biomagnification.

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[3]

[Total: 12]

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Answer **one** question.

EITHER

5 'Reducing food waste is the most effective strategy for managing food security.'

To what extent do you agree with this statement?

Give reasons and include information from relevant examples to support your answer.

[20]

OR

6 Evaluate geo-engineering as a strategy for counteracting climate change.

Give reasons and include information from relevant examples to support your answer.

[20]







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